

Did woolly mammoths roam the Kenai Peninsula? Part I

by Ted Bailey



Dr. R. Dale Guthrie emeritus professor at the University of Alaska-Fairbanks holds the tooth of a woolly mammoth. He proposed that a unique vegetation type—the Mammoth Steppe—allowed woolly mammoths and other ice age fauna to survive in Alaska and other high northern latitudes during the Pleistocene Ice Ages. Photo Credit: Mareca Guthrie.

Fascinated by ancient animals, my interest in mammoths began in earnest in 1975 when I first saw the recently discovered Mammoth Site at Hot Springs in the Black Hills of South Dakota. Because we periodically visited my wife's sister who lives nearby, I had the opportunity to revisit the Mammoth Site many times over the past 30 years. So far the remains of

over 50 mammoths have been uncovered and up to 100 may have been buried there about 26,000 years ago after they became trapped in a collapsed sinkhole. The site now claims to be the world's largest mammoth research facility.

Last year I also visited the famous La Brea Tar Pits in California where mammoths along with numerous dire wolves, saber-toothed cats and other animals were trapped and preserved in seeping tar pits beginning about 40,000 years ago. Later, near the town of Crawford in northwestern, Nebraska I saw the fossilized remains of two male mammoths that died about 12,000 years ago after their tusks became interlocked while fighting.

The American or Columbian mammoth (*Mammuthus columbi*) is the dominant species of mammoth at the South Dakota site, as well as at the La Brea Tar Pits and Nebraska sites. Columbian mammoths were an older and larger species found in many places across the contiguous United States. It is believed their ancestors (*M. meridionalis*) entered North America via the Bering Land Bridge about 1.7 million years ago. In contrast, the species of mammoth found in Alaska, called woolly mammoths (*M. primigenius*), were a later-developing species. Woolly mammoths were smaller and better adapted to a colder climate with long hair and short ears.

Although long extinct, mammoths continue to make headlines. Late last year geneticists using hair follicles sequenced a large proportion (an estimated 80%) of the genome—the DNA found in the nucleus of cells—of two frozen woolly mammoths found in Siberia. This and other recent genetic research on mammoths has allowed scientists to estimate that mammoths and elephants shared a common ancestor in Africa about 6 million years ago.

Recent genetic research also suggests there were three main groups of woolly mammoths: an exclusively Asian form, an exclusively American form, and one form that lived in both places. This evidence suggests that American woolly mammoths probably originated in America about 464,000 years ago, migrated west into Asia between 200,000 to 300,000 years ago and replaced two more primitive and indigenous

groups of woolly mammoths there. Later—around 11,500 years ago—the American woolly mammoths and their migrant progeny in Asia and Europe became extinct at the end of the last ice age.

For decades scientists have debated whether climate change or over-hunting by early humans—or a combination of both—caused the extinction of mammoths. But in January 2009, researchers reported in the journal *Science* evidence in the form of microscopic diamonds (nanodiamonds) apparently formed during the impact of an extraterrestrial object—a swarm of meteors or a comet—that exploded somewhere over Midwestern North America about 12,900 years ago.

The nanodiamond researchers propose that the impact caused an abrupt major climate cooling and the onset of a cold period known as the Younger Dryas that lasted about 1300 years. Although other scientists are skeptical and not yet convinced, the researchers propose that one of the numerous consequences of this extraterrestrial impact was the sudden demise of mammoths and other large mammals in North America during the last Ice Age. This hypothesis aired on PBS's science program *NOVA* as the Last Extinction this past Tuesday evening (March 31) and will probably be repeated again at 6pm on Sunday April 5.

Turning now to our own area, what factors must be considered to address whether or not woolly mammoths once roamed the Kenai Peninsula? One factor is the type of food mammoths ate. Analysis of the food remains in the stomachs and intestines of frozen woolly mammoths indicates that they were primarily grazers that fed on grasses and sedges and to a lesser extent on twigs of dwarf willows, herbs and mosses. Some scientists believe that woolly mammoths and other ice age fauna were able to live in high northern latitudes because of the existence of a unique type of cold, windy and dry grass-dominated vegetation unlike the wet shrub-tundra vegetation found at the same latitudes today. Paleontologist Dr. R. Dale Guthrie at the University of Alaska-Fairbanks first described this cold, windy and dry grassland vegetation type—which no longer exists—as the “Mammoth Steppe;” steppe is another name for grasslands. And, although the exact structure and extent of the Mammoth Steppe is still being debated, it appears that this landscape was most likely a mosaic of vegetation types dominated by the cold, dry grassland but interspersed with wetter sedge-moss meadows.

During the last glacial maximum, about 18,000

years ago, woolly mammoths inhabited the grassland steppes in an extensive ice-free area that included the interior of Alaska and the Yukon Territory, the connecting Bering Land Bridge (Beringia) and across northern Asia and Europe.

At this time, however, most of the Kenai Peninsula was still buried under ice. Geologist Dick Reger who has studied the glacial history of the Kenai Peninsula has shown that only a few isolated mountaintops and ridges in the northwestern Kenai Mountains, the Caribou Hills area and several large lowland lakes remained ice-free during the maximum extent of latest Pleistocene glaciers. The unglaciated uplands were small and isolated, and probably could not have supported a population of woolly mammoths even if they could have migrated from the Interior over miles of snow and ice to reach the Kenai Peninsula.

But what about the period after most of the Kenai glacial ice had melted and mammoths still lived in the Interior, say between 16,000 and 11,500 years ago?

There is no evidence that an Interior-like “Mammoth Steppe,” ever existed on the Kenai Peninsula, but pollen samples from several lakes in southcentral Alaska and on the Kenai Peninsula analyzed by Tom Ager of the U.S. Geological Survey indicate an herb-tundra first became established in the lowlands as early as 15,400 years ago. Although this might have been suitable habitat for woolly mammoths, it apparently did not last long.

Additional data from other Kenai Peninsula lake and bog cores collected by Ed Berg and analyzed by Scott Anderson from Northern Arizona University suggest that by about 14,000 to 13,000 years ago the formation of peat in bogs began and shrubs such as willow, alder and dwarf birch began to appear and became established after about 10,700 years ago, followed later by white spruce and still later (about 4000 years ago) by black spruce.

These warm, wet, shrub-dominated habitats would have been unfavorable to mammoths. Therefore except for a relatively brief period of time (15,400 to 14,000 years ago), the postglacial Peninsula was probably too wet and warm to support vegetation favorable to mammoths.

There is however a still earlier possibility to consider, which was a relatively warm period prior to the last major ice advance. This period, which could be called the last “interglaciation,” was one of many pauses in the Pleistocene glacial period that began 1.8 million years ago. This pause occurred between 30,000

to 60,000 years ago, according to the Greenland ice core temperature record.

Unfortunately, we know very little about the vegetation of this period. Anything growing on the landscape would have been destroyed or buried by the last glacial advance, which on the Kenai began 27,000 years ago and reached its maximum extent 23,000 years, so the chances of finding mammoth remains from this period are very slim, if mammoths indeed could have found anything to eat.

Another factor to consider is the age of the last woolly mammoths known to have survived in the interior of Alaska. According to a 2006 article in *Nature* magazine by Dale Guthrie, the latest known radiocarbon-dated woolly mammoths uncovered in the interior of Alaska and the Yukon Territory were about 11,500 years old; no younger specimens have been found, although some mammoths apparently survived longer, until about 8,000 years ago but only on St. Paul Island in the Pribilofs. And a dwarf woolly mammoth survived as late as 4,000 years ago on Siberia's isolated Wrangel Island.

Guthrie also showed that during a critical period from about 13,500 to 11,500 years ago the vegeta-

tion in Interior Alaska and the Yukon shifted from a very cold dry steppe dominated by grasses, sedges and sage (*Artemisia*) to a warmer, moister shrub-tundra dominated by abundant graminoids and edible woody shrubs especially willow, a habitat more favorable to moose. If woolly mammoths did somehow manage to disperse across ice and snow-covered mountainous terrain from the Interior to the Kenai Peninsula, the available evidence suggests they would have had to do so between 13,000 to 11,500 years ago because after about 11,500 years ago the vegetation was apparently becoming more unfavorable for their food requirements both in the Interior and on the Kenai.

Note: Part II of this article will examine reports of remains of woolly mammoths in the Cook Inlet basin and on the Kenai Peninsula and possible scenarios explaining their presence on the Kenai Peninsula.

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